Data from: NIST Properties of Molten Salts Database (formerly SRD 27)

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Introduction

NIST distributed the NIST Properties of Molten Salts Database from 1990 to 2004. As part of the NIST Standard Reference Data Program, the database was designated as Standard Reference Database 27 or SRD 27. Since the database has not been actively maintained since 1991 the SRD designation has been dropped. The database was distributed as a program for DOS[1] compatible operating systems. To enable use of the data on modern systems, the data have been extracted into comma separated variable (CSV) files. The CSV format should be readable by various programs and provides a stable format for long term preservation of the data. This document explains how the contents of the CSV files should be interpreted.

About the database

The database was designed to provide engineers and scientists rapid access to critically evaluated data for inorganic salts in the molten state. Properties include density, viscosity, electrical conductance, and surface tension, although not all properties are given for all salts. Properties for approximately 320 single salts and 4,000 multi-component systems are included, the latter being primarily binary. Some data for more complex salt mixtures are also given.

Data were abstracted from the literature over the period 1890-1990. The primary data sources are given in the references section below. These publications give references to the research papers and describe the methods of data evaluation.

These data are no longer considered Standard Reference Data. Information on the copyright status of this data can be found on the NIST web site at https://www.nist.gov/topics/data/public-access-nist-research/copyright-fair-use-and-licensing-statements-srd-data-and#data.

About the data in this distribution

In order to make the data from the database available to the public, the data from the original database program has been extracted into four comma-separated-variable (CSV) files. The data and accompanying comments were extracted from text files which were used by the database program. The original files were in a non-standard format.

There is one file for each of the properties covered by the database. Although the files are in CSV format, they are provided with a .txt extension. This is done to safeguard against programs which attempt to automatically elucidate data types. The second column in all data files contains the composition range. Some programs may interpret some of these values as dates, not text. When

[1] Any mention of commercial products is for information only; it does not imply recommendation or endorsement by NIST.

importing this data into another program, the contents of this column should always be treated as plain text.

Files in this distribution

This distribution contains the following files:

File name	Description
README.txt	Short text file with information about the data
molten-salt-data.pdf	More detailed description of the data in PDF/A format (this file)
conductivity-csv.txt	CSV file containing electrical conductivity data in $\Omega^{-1} \cdot cm^{-1}$
density-csv.txt	CSV file containing density data in $g \cdot cm^{-3}$
s-tension-csv.txt	CSV file containing surface tension data in $mN \cdot m^{-1}$
viscosity-csv.txt	CSV file containing viscosity data in $mN \cdot s \cdot m^{-2}$

Data file format

All four data files are formatted similarly. They consist of the following:

- A single entry stating the quantity provided and the units used.
- A blank line
- A line with text descriptions of the data in each column.
- Many lines of data
- A blank line
- Three one-entry lines describing the source of the data.
- A blank line
- A line with a single large entry describing the data format.

All the data files are encoded in ASCII.

The data are stored with one entry per row with columns defined as follows:

Column number	Name	Description
1	Salt	Chemical formula of salt or salt mixture
2	Composition range	Range of compositions for which the data applies
3	Data type	A string indicating the type of data in the row
4	T_{min}	Lower end of temperature range in Kelvin
5	T_{max}	Upper end of temperature range in Kelvin; may not be present if the data applies to a single temperature.
6	Uncertainty	Uncertainty (+/-) where available
7	D_1	Interpretation of this column depends on the “Data type” value
8	D_2	Interpretation of this column depends on the “Data type” value
9	D_3	Interpretation of this column depends on the “Data type” value
10	D_4	Interpretation of this column depends on the “Data type” value
11	D_5	Interpretation of this column depends on the “Data type” value

Column number	Name	Description
12	Comment	Optional comment text regarding the data; may supply uncertainty information
13	Formatting comment	Optional comment text disclosing a likely error in the data which was discovered when the data were reformatted

The interpretation of columns 7 through 12 (D_1 through D_5) depends on the data type designated in column 3. The data type codes are defined as follows:

Data Type	Value of property	Range of applicability
DP	D_1	The value is for D_2 Kelvin.
+E	$D_1 \cdot exp\ (D_2 / (8.31441 \cdot T))$	T is the temperature in Kelvin. The equation is valid for temperatures from T_{min} to T_{max} K.
E1	$D_1 \cdot exp\ ((D_2 / (8.31441 \cdot T)) + (D_3 / T^2))$	
E2	$D_1 \cdot exp\ (D_2 / (8.31441 \cdot (T - D_3)))$	
P1	$D_1 + D_2 \cdot T$	T is the temperature in Kelvin. The equation is valid for temperatures from T_{min} to T_{max} K.
P2	$D_1 + D_2 \cdot T + D_3 \cdot T^2$	
P3	$D_1 + D_2 \cdot T + D_3 \cdot T^2 + D_4 \cdot T^3$	
P4	$D_1 + D_2 \cdot T + D_3 \cdot T^2 + D_4 \cdot T^3 + D_5 \cdot T^4$	
I1	$D_1 + D_2 \cdot C$	C is the mole percent composition of the component noted in the "Composition range" column. This number should be a percentage (max value = 100) not a fraction. The data are valid for T_{min} K; the T_{max} column should be empty.
I2	$D_1 + D_2 \cdot C + D_3 \cdot C^2$	
I3	$D_1 + D_2 \cdot C + D_3 \cdot C^2 + D_4 \cdot C^3$	
I4	$D_1 + D_2 \cdot C + D_3 \cdot C^2 + D_4 \cdot C^3 + D_5 \cdot C^4$	

References

The following sources were listed as references in the original database distribution. Except for the addition of digital object identifiers (DOIs) where available, the formatting and numbering of the references below is the same as that in the original distribution. In some cases, the applicable salt or salt mixture is noted after the citation.

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